

an examiner may give means-plus-function language is that statutorily mandated in paragraph six. Accordingly, the PTO may not disregard the structure disclosed in the specification corresponding to such language when rendering a patentability determination.” *In re Donaldson Co.*, 16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994); MPEP 2181.

The specification describes the following acts corresponding to the second and the third means-plus-function clauses in claim 156:

**To the crude phenol bottoms stream is added water and a diluent composition** which is phase compatible with the crude phenolic bottoms stream in order to form a phase separable crude phenolic bottoms stream.

\* \* \*

While the diluent stream can be derived from any source, it is advantageous to recycle a portion of the crude acetone bottoms stream comprised of cumene and AMS through line (54) into the crude phenol bottoms stream in line (62). The hydrocarbons in the diluent stream in line (54) comprised of cumene and AMS flow through the process ultimately into line (102) from the distillation in the rectifier (100), and fed to the neutralizer (10), thereby closing the loop on the flow of the hydrocarbon portion of the diluent stream through the process with minimal discharge.

As an example, the density of the crude phenol bottoms stream may be on the order of 54-58 pcf at temperatures ranging from 180-210°C and at pressures sufficient to keep the stream in liquid state. Although phenol has a higher density than water, it is also readily miscible with water, rendering it difficult to obtain satisfactory phase separation between the hydrocarbon phase and the aqueous phase in a phase separation operation designed to remove the salts of neutralization. Accordingly, a hydrocarbon diluent having a lower density than the density of the crude phenol bottoms stream is added to enhance phase separation between the hydrocarbon and aqueous phase. This method of enhancing phase separation is more effective at removing salts than a method of increasing the salt concentration because by increasing the salt concentration, the amount of salt distributed into the hydrocarbon phase is increased and the effectiveness of the unit operation is reduced.

Diluents which are phase compatible and readily miscible with phenol, have a lower density than phenol, and which are phase incompatible with water under the operating conditions of the phase separator are preferred. Such diluents will attract solubilized phenol from the aqueous phase into the hydrocarbon phase. A diluent composition having a combined hydrocarbon density of 51-53.5 pcf comprised of 60-90 wt.% cumene, 10-30 wt.% of AMS, and optionally less than 10 wt.% of other hydrocarbons and no water is but one example, but is a preferred composition because it is readily obtainable as an extract from the acetone finishing operation. Optionally, if desired, the diluent composition may be

recycled directly from the acetone finishing column (40) to line (62) without first removing water. Another example of a suitable diluents include a stream of cumene or a stream of AMS, each as a fresh feed or derived from any source in the process.

Specification, p. 16, l. 27 - p. 18, l. 26 (emphasis added).

When means-plus-function claims 156-167 are read properly, as required under 35 U.S.C. § 112(6)--“to cover the corresponding structure, material, or acts described in the specification and equivalents thereof”-- claims 156-167 include the features referenced by the examiner, and do not fail to recite any critical features.

Applicant respectfully requests that the examiner withdraw the rejection of claims 156-167 under 35 U.S.C. § 112, first and second paragraphs.

**-Rejection of claims 169, 176, 183, 191, 192, 206, 213, 220 and 226-259**

The examiner rejects claims 169, 176, 183, 191, 192, 206, 213, 220, and 226-259 under 35 U.S.C. § 112, first and second paragraphs, on the grounds that the specification does not provide the necessary basis for “said organic diluent has a first density sufficiently less than a second density of said phenol to attract said remainder of said phenolic compounds from said mixture into an organic phase.” The examiner also contends that there is no indication in the specification that the density of the organic phase has any relationship to the attraction of the phenol. Accordingly, the examiner contends that “it cannot be determined what is within the purview of limitation ‘has a . . . density sufficiently less . . . to attract . . . phenolic compounds from said mixture into an organic phase.’”

**-Response**

Applicant again draws the examiner’s attention to page 18, ll. 10-p. 19, l. 8 of the specification, which reads as follows (emphasis added):

Diluents which are phase compatible and readily miscible with phenol, have a lower density than phenol, and which are phase incompatible with water under the operating conditions of the phase separator are preferred. **Such diluents will attract solubilized phenol from the aqueous phase into the hydrocarbon phase. A diluent composition having a combined hydrocarbon density of 51-53.5 pcf comprised of 60-90 wt.% cumene, 10-30 wt.% of AMS, and optionally less than 10 wt.% of other hydrocarbons and no water is but one example**, but is a preferred composition because it is readily obtainable as an extract from the acetone finishing operation. Optionally, if desired, the diluent

composition may be recycled directly from the acetone finishing column (40) to line (62) without first removing water. Another example of a suitable diluents include a stream of cumene or a stream of AMS, each as a fresh feed or derived from any source in the process.

**While a diluent hydrocarbon stream having a lower density than the crude phenol bottoms stream must be added to obtain satisfactory phase separation, the density difference need not be large. Although the invention is not restricted to a particular density difference, an advantage of the invention is that the hydrocarbon phase may be effectively separated from the aqueous phase in the phase separator (80) when the density difference between the two is only 1-2 pcf.** This advantage is achieved due to the low percentage of phenol present in the crude phenolic bottoms stream. A stream comprised of 85 wt.% or more phenol would require the use of a diluent having a larger density delta to effectively phase separate the aqueous phase due to the ready miscibility between phenol and water.

Although “**the density difference need not be large**” and “**the invention is not restricted to a particular density difference**” [specification, p. 18, ll. 31-31 (emphasis added)], pending dependent claims 170-172, 207-209, and 228-229 are specifically directed to the density differences described in the foregoing paragraphs of the specification.

Applicant respectfully requests withdrawal of the rejection of claims 169, 176, 183, 191, 192, 206, 213, 220, and 226-259 under 35 U.S.C. § 112, first and second paragraphs.

**Rejection of claims 156-167 under 35 U.S.C. § 102 (b)**

The examiner rejects claims 156-167 as anticipated by U.S. Patent No. 3,850,996 (the “996 patent). The examiner contends that “the heavy ends fraction” of the ‘996 patent “and the claimed crude phenolic bottoms stream appear to be one and the same.” The examiner contends that the ‘996 patent “discloses a means for separating the phenol into an organic phase by distillation anticipating the claims. The diluent recited in some of the independent claims reads on the hydrocarbons present in the separated phenol of the reference.”

**Response**

In order to establish a case of *prima facie* anticipation of claim 156 over the ‘996 patent, the examiner must establish that the ‘996 patent discloses every limitation of the

claimed invention either explicitly or inherently. *Atlas Powder Co. v. Ireco Inc.*, 190 F.3d 1342, 1346, 51 USPQ2d 1943, 1945 (Fed. Cir. 1999).

The limitation of process claim 156 directed to “means for separating at least a portion of said remainder of said phenolic compounds from said crude phenolic bottoms stream into an organic phase” must be read to cover the corresponding “acts described in the specification and equivalents thereof.” 35 U.S.C. § 112(6). Generally, the specification describes adding an organic diluent to phase separate phenol from the crude phenol bottoms stream, hereinafter referred to as “phase separation of a crude phenol bottoms stream to separate the phenol into an organic portion comprising an organic diluent.” See specification, pp. 15, ll. 22 - p. 29.

In contrast, the ‘996 patent is specifically directed to a process for “**establishing and maintaining pyrolysis**” of the “pyrolyzable portion” of the “heavy ends fraction” referred to by the examiner. The ‘996 patent explains, with reference to that heavy bottoms:

**Because the bottom fraction is a maximum boiling azeotrope, separation of phenol from the fraction heretofore has generally been effected by an extraction procedure employing an aqueous solution of sodium hydroxide as the extracting agent.**

**This invention provides a process for the treatment of the heavy ends fraction in which the heavy ends fraction is pyrolyzed**, and at the same time phenol substantially free of acetophenone is recovered without going through an extraction procedure.

In summary, this invention, broadly considered, comprises a process for treating the heavy ends fraction of cumene hydroperoxide cleavage reaction mixture to obtain therefrom a product comprising hydrocarbons and phenol with the weight ratio of acetophenone to phenol in the product being substantially less than the weight ratio of acetophenone to phenol in the heavy ends fraction. **The process comprises establishing and maintaining pyrolysis of the pyrolyzable portion of said fraction** of phenol and hydrocarbons occurs (b) at substantial superatmospheric pressure (c) for a period of time sufficient for substantial pyrolysis of the pyrolyzable portion of said fraction to phenol and hydrocarbons to occur, whereby said product is formed as a vapor, and removing said vaporous product from the residue of said fraction.

‘996 patent, col. 2, ll. 2-27 (emphasis added).

What the examiner has pointed to in the '996 patent is a teaching to **pyrolyze** a stream which the allegedly corresponds to the crude phenolic bottoms stream of the claims. The examiner has **not** pointed to a teaching in the '996 patent to phase separate a crude phenol bottoms stream to separate the phenol into an organic portion comprising an organic diluent. The examiner has not pointed to acts in '996 patent which correspond to the "acts described in the specification and equivalents thereof." 35 U.S.C. § 112(6). *In re Donaldson Co.*, 16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994); MPEP 2181. The examiner has not established that the '996 patent discloses every limitation of claims 156-167, either explicitly or inherently, as those claims are properly construed under 35 U.S.C. § 112(6).

The examiner certainly has not pointed to a teaching of a process where the organic phase comprises a weight ratio of organic diluent to crude phenolic bottoms stream recited in claims 157-159, or in which 80 or 90 wt.% salts of neutralization are removed in one or more aqueous streams, as recited in claims 160-167.

For the foregoing reasons, the examiner has not established a case of *prima facie* anticipation of claims 156-167 over the '996 patent. *Atlas Powder Co. v. Ireco Inc.*, 190 F.3d 1342, 1346, 51 USPQ2d 1943, 1945 (Fed. Cir. 1999).

**Rejection of claims 156-167 as anticipated by U.S. Patent No. 2,715,145**

The examiner also rejected claims 156-167 as anticipated by U.S. Patent No. 2,715,145 ("the '145 patent").

**Response**

The examiner has not established that the '145 patent teaches a process of phase separation of a crude phenol bottoms stream to separate the phenol into an organic portion comprising an organic diluent. 35 U.S.C. §§ 112(6) and 102 (b). Rather, the method described in the '145 patent **pyrolyzes** the stream which allegedly corresponds to the claimed crude phenolic bottoms stream.

The '145 patent explains that "[t]his invention is based on the discovery that besides the named compounds a residue with a boiling point which is higher than that of phenol and acetophenone is formed." '145 patent, col. 1, ll. 24-27. At col. 2, the '145 patent teaches that "[t]he decomposition of the material which boils at higher temperatures than the boiling points of phenol and acetophenone may be achieved by

heating said material to temperatures at which pyrolysis takes place.” ‘145 patent, col. 2, ll. 1-4 (emphasis added).

The examiner comments that “[t]he diluent recited in some of the independent claims reads on the hydrocarbons present in the separated phenol of the reference.” However, **the composition of the pyrolyzed stream described in the ‘145 patent is irrelevant** to whether the ‘145 patent teaches the claimed **process** for manufacturing phenolic compounds.

The claimed process, under 35 U.S.C. § 112(6), involves adding an organic diluent to a crude phenol bottoms stream to phase separate the phenol into an organic portion comprising the organic diluent (and equivalents thereof). In contrast, the examiner has pointed to a stream allegedly corresponding to the claimed crude phenolic bottoms stream, and to **a process for pyrolyzing that stream**. The examiner has not pointed to acts in ‘145 patent which correspond to the “acts described in the specification and equivalents thereof.” 35 U.S.C. § 112(6). *In re Donaldson Co.*, 16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994); MPEP 2181.

The examiner certainly has not pointed to a teaching of a process where the organic phase comprises a weight ratio of organic diluent to crude phenolic bottoms stream recited in claims 157-159, or in which 80 or 90 wt.% salts of neutralization are removed in one or more aqueous streams, as recited in claims 160-167.

The examiner has not established that the ‘145 patent discloses every limitation of claims 156-167, either explicitly or inherently, as those claims are properly construed under 35 U.S.C. § 112(6). The examiner therefore has not established a case of *prima facie* anticipation of the **process** of claims 156-167 over the ‘145 patent. *Atlas Powder Co. v. Ireco Inc.*, 190 F.3d 1342, 1346, 51 USPQ2d 1943, 1945 (Fed. Cir. 1999).

#### **Rejection of claims 156-167 as obvious over the ‘996 patent and the ‘145 patent**

The examiner rejected claims 156-167 as obvious under 35 U.S.C. § 103 over the ‘996 patent and the ‘145 patent, contending that “the claims read on obvious variants of the prior art processes.”

#### **Response**

In order to establish that claims 156-167 are *prima facie* obvious over the prior art, the examiner must point to two things in the prior art, and not in the applicant's

disclosure--(1) the suggestion of the invention, and (2) the expectation of its success. *In re Vaeck*, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991). See also MPEP 2143.

As explained above with respect to anticipation, the examiner has not pointed to a teaching or suggestion in either the '996 patent or in the '145 patent to add an organic diluent to a crude phenol bottoms stream to phase separate phenol into an organic phase comprising the organic diluent. The examiner therefore has not pointed to a teaching or suggestion of the process of claims 156-167 in the '996 patent or in the '145 patent. The examiner certainly has not pointed to an expectation of success of this untaught method in the '996 patent or the '145 patent.

The examiner cannot establish *prima facie* obviousness merely by arguing that the process of claims 156-167 could be derived by modifying the '996 patent or the '145 patent so that the crude phenol bottoms stream was not pyrolyzed, but instead an organic diluent was added to the crude phenol bottoms stream in order to phase separate phenol into an organic phase comprising the organic diluent. In order to establish *prima facie* obviousness of this feature of the claims, the examiner has the burden to point to a teaching or suggestion in the **references themselves** that it would be desirable to make such a modification. MPEP 2143.01; *In re Brouwer*, 37 U.S.P.Q.2d 1663, 1666 (Fed. Cir. 1995).

The examiner has not pointed to any teaching or suggestion that would motivate a person of ordinary skill in the art to modify either the '996 patent or the '145 patent to add an organic diluent and phase separate phenol from the alleged stream rather than pyrolyzing the stream.

The examiner certainly has not pointed to a teaching of a process where the organic phase comprises a weight ratio of organic diluent to crude phenolic bottoms stream recited in claims 157-159, or in which 80 or 90 wt.% salts of neutralization are removed in one or more aqueous streams, as recited in claims 160-167. Nor has the examiner pointed to a teaching or suggestion that would motivate a person of ordinary skill in the art to modify the '996 patent in the manner required to result in the process of claims 157-167.

For the foregoing reasons, the examiner has not established a case of *prima facie* obviousness of claims 156-167 over the '966 patent or the '145 patent.

**Rejection of claims 156-259 as anticipated by U.S. Patent No. 2,727,074**

The examiner contends that U.S. Patent No. 2,727,074 anticipates claims 156-259. The examiner contends that “[t]he reference discloses a means for separating the phenol into an organic phase by extracting the residues with sodium hydroxide and treating with acid anticipating the claims.”

**Response**

The following is a summary of relevant limitations of the rejected claims:

**Claim 156-167**

As explained above, claims 156-167 are means plus function claims, which must be construed to cover the corresponding “acts described in the specification and equivalents thereof.” 35 U.S.C. § 112(6). As properly construed, claims 156-167 are directed to a process “for the manufacture of phenolic compounds” in which, among other things, an organic diluent is added to a crude phenolic bottoms stream to separate phenol from the crude phenol bottoms stream into an organic phase comprising the organic diluent. *Id.*

**Claim 168-204**

Claim 168 includes the following limitations:

treating said crude phenol bottoms stream with a first quantity of aqueous material and with a second quantity of an organic diluent, said second quantity being effective to solubilize said remainder of said phenolic compounds, producing a mixture;

allowing said mixture to phase separate, recovering said phenolic compounds in an organic phase comprising said organic diluent.

Claims 169-204 directly or indirectly include the foregoing limitations.

**Claim 205-225**

Claim 205 contains the following limitations:

treating said crude phenol bottoms stream with a first quantity of aqueous material and with **a second quantity of an organic diluent**, said second quantity being effective to solubilize said remainder of said phenolic compounds to produce a mixture, wherein a weight ratio of said organic diluent to said crude phenolic bottoms stream is at least 0.15:1;

allowing said mixture to phase separate, recovering said phenolic compounds in an organic phase comprising said organic diluent.



Claims 206-225 directly or indirectly include the foregoing limitations.

**Claim 226-259**

Claim 226 contains the following limitations:

treating said crude phenol bottoms stream with a first quantity of aqueous material and a **second quantity of an organic diluent**, said second quantity being effective to solubilize said remainder of said phenolic compounds producing a mixture, wherein said organic diluent has a first density sufficiently less than a second density of phenol to attract said remainder of said phenolic compounds from said mixture into an organic phase comprising said organic diluent;

allowing said mixture to phase separate to produce an organic phase comprising said phenolic compounds and said organic diluent.

Claims 227-259 directly or indirectly include the foregoing limitations.

**Argument**

The examiner has not established a *prima facie* case of anticipation of means-plus function claims 156-167 because the examiner has not established that the '074 patent teaches "phase separation of a crude phenol bottoms stream to separate the phenol into an organic portion comprising an organic diluent." *Id.*; 35 U.S.C. §§ 112(6) and 102 (b). The examiner has not established a *prima facie* case of anticipation of any of claims 168-229 because the examiner has not pointed to a teaching in the '074 patent of "treating said crude phenol bottoms stream with a first quantity of aqueous material and with a **second quantity of an organic diluent**, said second quantity being effective to solubilize said remainder of said phenolic compounds to produce a mixture." Nor has the examiner pointed to a teaching in the '074 patent of "allowing said mixture to phase separate to produce an organic phase" comprising the phenolic compounds and the organic diluent.

In the phase separation described in the specification, water and an **organic diluent** are added to the crude phenol bottoms stream to attract solubilized phenol from the aqueous phase into the organic phase comprising the organic diluent. Specification, p. 18, ll. 10-16. The examiner has not pointed to a teaching in the '074 patent to add an organic diluent to a crude phenol bottoms stream in order to separate the phenol into an organic portion comprising the organic diluent.

The examiner contends that “[t]he diluent recited in some of the independent claims reads on the isopropyl benzene added to the residue, e.g., Example 2.” However, Example 2 of the ‘074 patent teaches a method for **distilling** the residue which allegedly correspond to the crude phenolic bottoms stream of the claims. The distilling results in **recovery** of isopropyl benzene:

936 parts of a residue as obtained in Example 1 was continuously fed into a still kettle fitted with a fractionating column whilst the vapours were continuously removed, the temperature at the top of the column being kept at 180°-200°C. The temperature in the kettle was allowed to rise to 405 °C. 715 parts of a distillate were obtained which contained 242 parts of phenol and 228 parts of alpha methyl styrene and 185 parts consisting mainly of isopropyl benzene.

**It is irrelevant whether or not the distilled stream described in the ‘074 patent contains isopropyl benzene.** What is relevant is that the examiner has not pointed to a teaching or suggestion of the process of the claims:

(a) Claims 156-167: The examiner has not pointed to a teaching of “phase separation of a crude phenol bottoms stream to separate the phenol into an organic portion comprising an organic diluent.” *Id.*; 35 U.S.C. §§ 112(6) and 102 (b); or,

(b) Claims 168-259: The examiner has not pointed to a teaching of:

treating said crude phenol bottoms stream with a first quantity of aqueous material and with **a second quantity of an organic diluent**, said second quantity being effective to solubilize said remainder of said phenolic compounds to produce a mixture

\* \* \*

allowing said mixture to phase separate to produce an organic phase” comprising the phenolic compounds and the organic diluent.

With respect to claims 156-167, the examiner has not pointed to acts in ‘074 patent which correspond to the “acts described in the specification and equivalents thereof.” 35 U.S.C. § 112(6). *In re Donaldson Co.*, 16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994); MPEP 2181. The examiner certainly has not pointed to a teaching of a process where the organic phase comprises a weight ratio of organic diluent to crude phenolic bottoms stream recited in claims 157-159, or in which 80 or 90 wt.% salts of neutralization are removed in one or more aqueous streams, as recited in claims 160-167.

The examiner clearly has not pointed to a teaching in the ‘074 patent:

- a. To add an organic diluent having the density specified in claims 169-172, claims 206-209, claims 228-230;
- b. To add an organic diluent to result in the wt.% ratio of claims 189-205 (and dependent claims from 205) or claims 245-259;
- c. To add an organic diluent having the composition of claims 173-174, claims 210-211, claims 231-232; and/or
- d. To remove at least 80 wt.% or 90 wt.% of the salts of neutralization in one or more aqueous streams, as specified in claims 175-188, 212-225, 233-244.

The examiner has not established that the '074 patent discloses every limitation of claims 156-259, either explicitly or inherently. The examiner therefore has not established a case of *prima facie* anticipation of the **process** of claims 156-259 over the '074 patent. *Atlas Powder Co. v. Ireco Inc.*, 190 F.3d 1342, 1346, 51 USPQ2d 1943, 1945 (Fed. Cir. 1999).

**Rejection of claims 156-259 as obvious over the '074 patent**

The examiner also rejected claims 156-259 as obvious over the '074 patent.

**Response**

The examiner has not pointed to a teaching or suggestion in the '074 patent of (1) a suggestion of the claimed process, or (2) an expectation of its success. *In re Vaeck*, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991). See also MPEP 2143.

As explained above with respect to the anticipation rejection, the examiner has not pointed to a teaching or suggestion in the '074 patent to add an organic diluent to a crude phenol bottoms to separate phenol into an organic phase comprising the organic diluent. These limitations are present in claims 156-167 if they are properly construed under 35 U.S.C. § 112(6). These limitations also are expressly stated in claims 168, 205 and 226, and are directly or indirectly present in all of claims 168-259. The examiner has not pointed to a teaching or suggestion of these process limitations in the '074 patent. The examiner certainly has not pointed to an expectation of success of this untaught process in the '074 patent.

Nor has the examiner pointed to a teaching or suggestion in the '074 patent:

- a. To add an organic diluent having the density specified in claims 169-172, claims 206-209, claims 228-230;
- b. To add an organic diluent to result in the wt.% ratio of claims 189-205 (and dependent claims from 205) or claims 245-259;
- c. To add an organic diluent having the composition of claims 173-174, claims 210-211, claims 231-232; and/or
- d. To remove at least 80 wt.% or 90 wt.% of the salts of neutralization in one or more aqueous streams, as specified in claims 175-188, 212-225, 233-244.

The examiner cannot establish that the process of claims 156-259 is *prima facie* obvious over the '074 patent merely by arguing that the '074 patent could be modified to add a suitable organic diluent, or to perform the foregoing acts, as required by claims 156-259, either in place of or in addition to sodium hydroxide. In order to establish *prima facie* obviousness, the examiner has the burden to point to a teaching or suggestion in the **references themselves** that it would be desirable to make such a modification. MPEP 2143.01; *In re Brouwer*, 37 U.S.P.Q.2d 1663, 1666 (Fed. Cir. 1995).

The examiner has not pointed to any teaching or suggestion in any reference that would motivate a person of ordinary skill in the art to modify the '074 patent to add an organic diluent to the crude phenol bottoms stream in the '074 patent.

For the foregoing reasons, the examiner therefore has not established a case of *prima facie* obviousness of claims 156-259 over the '074 patent.

**Rejection of claims 156-167 under 35 U.S.C. 102 (e)  
over U.S. Patent No. 5,847,235 v. U.S. Patent No. 5,510,543**

The examiner rejects claims 156-167 under 35 U.S.C. § 102(e) over U.S. patent No. 5,847,235 ("the Dyckman '235 patent") in view of U.S. Patent No. 5,510,543 ("the '543 patent"). According to the examiner, the Dyckman '235 patent teaches treating a phenol tar with water, but does not teach reacting a cleavage mass as recited in the claims. The examiner indicates that '543 patent is not relied upon as prior art, but as evidence that phenol tar is prepared by the cleavage mass treatment steps recited in the claims.

## Response

The Dyckman '235 patent is directed to "[a] method for reduction of salt content in phenol tars with no additional solvent" (Dyckman '235, abstract). Dyckman '235 teaches that:

**No extra solvents are employed to dilute the phenol tar** to make it less viscous in order to facilitate intimate admixture and then efficient phase separation.

Surprisingly the **direct contact of undiluted phenol tar with water alone** in the present process gives superior extraction performance. Admixture of the phenol tar alone with water alone is usually sufficient as a result of the turbulence from the countercurrent flows in the extractor.

Dyckman '235, col. 3, ll. 4-11 (emphasis added). Dyckman '235 "desalts the phenol tar with water alone as extractant, without the addition of any chemicals." Dyckman '235, col. 2, l. 32-33. "The salt is removed in the water effluent. Because no additives are required in order to extract the salts from the tar, the water and tar phases rapidly separate after admixture efficiently removing substantially all of the salts from the tar." Dyckman '235, col. 2, ll. 40-43.

Claims 156-167 must be construed to cover the corresponding "acts described in the specification and equivalents thereof." 35 U.S.C. § 112(6). As previously discussed, the specification describes addition of an organic diluent to phase separate phenol from the crude phenol bottoms stream into an organic phase comprising the organic diluent. The examiner has not pointed to a teaching in the Dyckman '235 patent to add an organic diluent to a crude phenolic bottoms stream. The examiner has not pointed to acts in Dyckman '235 patent which correspond to the "acts described in the specification and equivalents thereof." 35 U.S.C. § 112(6). *In re Donaldson Co.*, 16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994); MPEP 2181.

The examiner certainly has not pointed to a teaching of a process where the organic phase comprises a weight ratio of organic diluent to crude phenolic bottoms stream recited in claims 157-159, or in which 80 or 90 wt.% salts of neutralization are removed in one or more aqueous streams, as recited in claims 160-167.

The examiner has not established that the '235 patent discloses every limitation of claims 156-167, either explicitly or inherently, as those claims are properly construed under 35 U.S.C. § 112(6). The examiner therefore has not established a case of *prima*

*facie* anticipation of the **process** of claims 156-167 over the Dyckman '235 patent, alone or in view of the '543 patent. *Atlas Powder Co. v. Ireco Inc.*, 190 F.3d 1342, 1346, 51 USPQ2d 1943, 1945 (Fed. Cir. 1999).

**Rejection of claims 156-167 as obvious over the '235 patent v. the '543 patent**

The foregoing excerpts from Dyckman '235 demonstrate that the examiner has not pointed to a teaching or suggestion in the Dyckman '235 patent to add an organic diluent to a crude phenol bottoms stream in order to phase separate phenol in the stream into an organic phase comprising the organic diluent.

The examiner cannot establish *prima facie* obviousness by merely arguing that the method of claims 156-167 could be derived by modifying the Dyckman '235 patent to add an organic diluent to the crude phenol bottom stream to phase separate the phenol into an organic phase comprising the organic diluent. In order to establish *prima facie* obviousness, the examiner has the burden to point to a teaching or suggestion in the **references themselves** that it would be desirable to modify the Dyckman '235 patent to add the claimed organic diluent to the allegedly corresponding stream, either alone or together with the sodium hydroxide. MPEP 2143.01; *In re Brouwer*, 37 U.S.P.Q.2d 1663, 1666 (Fed. Cir. 1995). The examiner has not pointed to the required teaching or suggestion in the Dyckman '235 patent, in the '543 patent, or elsewhere.

Nor has the examiner pointed to a teaching or suggestion in the '074 patent:

- a. To add an organic diluent having the density specified in claims 169-172, claims 206-209, claims 228-230;
- b. To add an organic diluent to result in the wt.% ratio of claims 189-205 (and dependent claims from 205) or claims 245-259;
- c. To add an organic diluent having the composition of claims 173-174, claims 210-211, claims 231-232; and/or
- d. To remove at least 80 wt.% or 90 wt.% of the salts of neutralization in one or more aqueous streams, as specified in claims 175-188, 212-225, 233-244.

In fact, the sodium hydroxide added to the allegedly corresponding stream in the Dyckman '235 patent is not an organic diluent, but an inorganic caustic. The Dyckman '235 patent actually teaches away from adding an organic diluent to a crude phenol

bottoms stream to accomplish the phase separation. This is "strong evidence of unobviousness." *In re Hedges*, 228 U.S.P.Q. 685, 687 (Fed. Cir. 1986), quoting *W. L. Gore & Assoc. v. Garlock, Inc.*, 220 U.S.P.Q.303, 312 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984).

The examiner has not established a case of *prima facie* obviousness of claims 156-167 over the '235 patent in view of the '543 patent. Applicant respectfully requests that the obviousness rejection be withdrawn.

### **CONCLUSION**

For all of the foregoing reasons, applicant respectfully requests reconsideration and allowance of all of the pending claims.

Respectfully submitted,



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

|                                    |   |                              |
|------------------------------------|---|------------------------------|
| In re Application of:              | § | Group Art Unit: 1621         |
| Taggart II, et al.                 | § |                              |
|                                    | § |                              |
| Serial No.: 09/304,298             | § |                              |
|                                    | § | Examiner: Michael L. Shippen |
| Filed: May 3, 1999                 | § |                              |
|                                    | § |                              |
| For: Removal of Salts in the Manu- | § |                              |
| facture of Phenolic Compound       | § | Atty. Docket: SHELL-TH1118   |

**MARKED UP CLAIMS FILED WITH  
RESPONSE TO FIRST OFFICE ACTION AFTER RCE**

168. (Amended) A process for manufacturing phenolic compounds comprising:
- separating acetone and phenol from a wholly or partially neutralized aralkyl hydroperoxide cleavage mass comprising salts of neutralization to produce a crude phenolic stream comprising said salts of neutralization;
  - separating said crude phenolic stream to produce a concentrated phenolic-rich stream and a crude phenol bottoms stream, said crude phenol bottoms stream comprising said salts of neutralization and a remainder of said phenolic compounds;
  - treating said crude phenol bottoms stream with a first quantity of aqueous material and with a second quantity of an organic diluent, said second quantity being effective to solubilize said remainder of said phenolic compounds, producing a mixture;
  - allowing said mixture to phase separate, recovering said phenolic compounds in an organic phase comprising said organic diluent.
205. (Amended) A process for manufacturing phenolic compounds comprising:



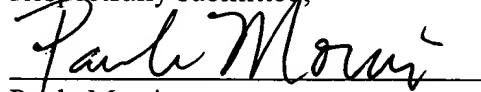
separating acetone and phenol from a wholly or partially neutralized aralkyl hydroperoxide cleavage mass comprising salts of neutralization to produce a crude phenolic stream comprising said salts of neutralization;  
separating said crude phenolic stream to produce a concentrated phenolic-rich stream and a crude phenol bottoms stream, said crude phenol bottoms stream comprising said salts of neutralization and a remainder of said phenolic compounds;  
treating said crude phenol bottoms stream with a first quantity of aqueous material and with a second quantity of an organic diluent, said second quantity being effective to solubilize said remainder of said phenolic compounds to produce a mixture, wherein a weight ratio of said organic diluent to said crude phenolic bottoms stream is at least 0.15:1;  
allowing said mixture to phase separate, recovering said phenolic compounds in an organic phase comprising said organic diluent.

226. (Amended) A process for manufacturing phenolic compounds comprising:

separating acetone and phenol from a wholly or partially neutralized aralkyl hydroperoxide cleavage mass comprising salts of neutralization to produce a crude phenolic stream comprising said salts of neutralization;  
separating said crude phenolic stream to produce a concentrated phenolic-rich stream and a crude phenol bottoms stream, said crude phenol bottoms stream comprising said salts of neutralization and a remainder of said phenolic compounds;  
treating said crude phenol bottoms stream with a first quantity of aqueous material and a second quantity of an organic diluent, said second quantity being effective to solubilize said remainder of said phenolic compounds producing a mixture, wherein said organic diluent has a first density sufficiently less than a second density of phenol to attract said remainder

of said phenolic compounds from said mixture into an organic phase comprising said organic diluent;  
allowing said mixture to phase separate to produce an organic phase comprising said phenolic compounds and said organic diluent.

Respectfully submitted,

A handwritten signature in cursive script, reading "Paula Morris", written over a horizontal line.

Paula Morris

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